

From: ["Lazorchak, Jim" </O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP \(FYDIBOHF23SPDLT\)/CN=RECIPIENTS/CN=35FF2FDC97364A8A8CE01F9A8B53F015-LAZORCHAK, JIM>](#)

To: [Forshay](#)

CC: [Ken](#)
[Blackwood](#)
[Kevin:Meier](#)
[John:Mount](#)
[Dave](#)

Date: 4/1/2014 6:57:39 AM

Subject: RE: Tolerance of Aquatic Invertebrates to Gasoline or other Petroleum Products

Attachments: [SUMMARY OF PUBLISHED AQUATIC Toxicity information and water quality criteria for selected VOCs.pdf](#)

I struck out in our Aquire Database but found a USGS report on PAHs that might help.

Jim

From: Forshay, Ken
Sent: Monday, March 31, 2014 6:11 PM
To: Lazorchak, Jim
Cc: Blackwood, Kevin
Subject: FW: Tolerance of Aquatic Invertebrates to Gasoline or other Petroleum Products

Jim,

You guys are the experts on inverts. Could you direct Kevin to the right people to help him out determining whether there is an effect of trace petroleum on inverts? He works for one of the other researchers on aquifer issues here.

Kevin,

Scents usually are detectable at really low levels, so there could be gas and oil from anywhere that makes that smell. Not to mention that Oklahoma mostly smells like oil. Snails and crayfish are pretty sensitive to things (mostly Dissolved Oxygen and sediment) so that makes me think that there is not a whole lot that can be gleaned from a quick inventory. There may be some more intensive taxonomic methods that could elucidate an effect, but that is not my area of expertise and I personally (not professionally) think it will be really tough to demonstrate much with the inverts... but Jim Lazorchak's group are super experts on inverts and contamination and I would defer to pretty much anything he has to say.

Yeah, microbes eat petroleum really well and most of the processes I work on are stimulated by a good organic carbon source like refined gas in low concentration. You could get a drop in DO or some direct tox effects that change the makeup of the communities, but I'm not sure it will be that easy. Anything definitive would need some

serious rigor. This would be a good place for the voc work that we used to do. You might talk to John Wilson before he leaves. Algae and periphyton mats are just really common and natural. They are stimulated by lots of things that limit their growth. Nutrients, temperature, organic carbon for the microbes, metals... and on and on. So, I would say you need a lot more info to even suggest that there is a spill or some contamination in the surface water that can in any way be attributable to release to the shallow GW aquifer. Like pools of gas in the trench or residues around the sink holes. A full on well placement with some good waterchem including voc's.

So to answer your question, I'm not sure, but you never know until you measure things.

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ORD/NRMRL/GWERD/ESPB

Office of Research and Development/National Risk Management Research Laboratory/Groundwater and Ecosystem Restoration Division/Ecosystem and Subsurface Protection Branch

For myself I am an optimist, it does not seem to be much use being anything else.

Winston Churchill

From: Blackwood, Kevin
Sent: Monday, March 31, 2014 4:13 PM
To: Forshay, Ken
Subject: Tolerance of Aquatic Invertebrates to Gasoline or other Petroleum Products

Ken,

I was wondering if you might be able help me with a issue...

In May 2013, following the storm that produced the Moore tornado, I ran out to collect flood discharge data from cave springs in the west Arbuckle Mountains. At one spring (Tulip Creek Cave Spring) near HW77 - a strong gasoline odor was coming from the spring and was strong enough to give me a sharp headache in about 10 seconds of

standing there.

I recently met with the landowner and received permission to investigate this weekend. We indentified 3 pipelines (2 active and 1 inactive) that crossed over a heavily karsted area within 0.3 and 0.7 miles from the spring. One of the pipelines is listed as a "refined products" pipeline and emanates from the Valero refinery. The other active pipe is owned by BlueKnight and appears to be carrying crude. In a few places the pipelines were trenched right through the center of sinkholes (large sinkholes with catchment areas the size of moderate farm ponds).

After conducting our inventory of "aquifer recharge features", we ran down to the spring to collect water samples and look for signs of life. I couldn't detect a gasoline odor, but there was a distinct unfamiliar smell. There was also a lot of algae (and/or microbial mats) outside the spring. These were very similar to the microbial mats that occur in the sulfur wells in the town of Sulphur (which may occur at the flanks of the aquifer in the confined portions at the freshwater / saline water / petroleum interface). We flipped over several rocks looking for any signs of life and found 3 groundwater isopods, 1 crayfish, some undetermined insect larvae (worm-like), and about a dozen snails.

The landowner said that "every time a good rain pours down you can smell that gasoline odor". I was curious if you might have an idea about how much tolerance the above mentioned organisms might have to gasoline? I'm thinking the base flow of the spring is moving through a deeper unaffected zone and most of the leaking contaminants are held in the epikarst and flushed into the deeper phreatic sections during rains, resulting in the strong odor. I'm curious as to whether this flushing of gasoline might be killing organisms at the spring and then is recolonized once baseflow is restored or if these organisms might be surviving the flushing altogether. I'm thinking the algae or microbial mats might in fact be bacteria that are breaking down contaminants.

If you've conducted ecological studies post-gasoline spill / leak or have any idea what these critters can tolerate, or know anyone that might know, any feedback or referrals is much appreciated.

Thanks,

-Kevin